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Report No.: SZEM150400181804
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RF Exposure Evaluation Report

Application No.: SZEM1504001818HR (SGS SH No.: SHEM1504000976HR)
Applicant: Sunwave Communications Co., Ltd
Manufacturer: Sunwave Communications Co., Ltd
Factory: Sunwave Communications Co., Ltd
Product Name: Remote Unit
Product Description: The RU conducts digital-analog conversion and power amplification of the input signals.
Model No.(EUT): iDAS-R211
Trade Mark: CROSSFIRE
FCC ID: 2AEJ4R2115W
Standards: 47 CFR Part 1.1307 (2014)
47 CFR Part 1.1310 (2014)
Date of Receipt: 2015-04-15
Date of Test: 2015-04-17 to 2015-05-07
Date of Issue: 2015-05-08

Test Result :	PASS*
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* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Jack Zhang
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00		2015-05-08		Original

Authorized for issue by:			
Tested By		2015-05-07	
	<hr/>		
	(Chris Zhong) /Project Engineer	Date	
Prepared By		2015-05-08	
	<hr/>		
	(Hedy Wen) /Clerk	Date	
Checked By		2015-05-08	
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	(Jim Huang) /Reviewer	Date	

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4 General Information

4.1 Client Information

Applicant:	Sunwave Communications Co., Ltd
Address of Applicant:	Sunwave Building 581 Huoju Avenue, Binjiang District, Hangzhou, P.R.China Zip: 310053
Manufacturer:	Sunwave Communications Co., Ltd
Address of Manufacturer:	Sunwave Building 581 Huoju Avenue, Binjiang District, Hangzhou, P.R.China Zip: 310053
Factory:	Sunwave Communications Co., Ltd
Address of Factory:	Sunwave Building 581 Huoju Avenue, Binjiang District, Hangzhou, P.R.China Zip: 310053

4.2 General Description of EUT

Product Name:	Remote Unit
Model No.:	iDAS-R211
Trade Mark:	CROSSFIRE
Sample Type:	Fixed production
Antenna Gain:	12.5dBi
Power Supply:	AC120V 60Hz
Optical Fiber:	100cm (unshielded)
DC Cable:	120cm (unshielded)
RF Cable:	100cm (shielded)
Type of Modulation	LTE, WCDMA, CDMA
Frequency Band:	Downlink 869MHz to 894MHz include the Modulation:LTE,CDMA,WCDMA; Downlink 2496MHz to 2568MHz include the Modulation:LTE,CDMA,WCDMA;

4.3 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch E&E Lab

No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China 518057

Telephone: +86 (0) 755 2601 2053 Fax: +86 (0) 755 2671 0594

No tests were sub-contracted.

4.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **VCCI**

The 10m Semi-anechoic chamber and Shielded Room (7.5m x 4.0m x 3.0m) of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 respectively.

- **FCC – Registration No.: 556682**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 556682.

- **Industry Canada (IC)**

Two 3m Semi-anechoic chambers of SGS-CSTC Standards Technical Services Co., Ltd. have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1 & 4620C-2.

4.5 Deviation from Standards

None.

4.6 Abnormalities from Standard Conditions

None.

4.7 Other Information Requested by the Customer

None.





5 RF Exposure Evaluation

5.1 RF Exposure Compliance Requirement

5.1.1 Limits

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500 .....	.....	.....	f/1500	30
1500–100,000 .....	.....	.....	1.0	30

F= Frequency in MHz

Friis Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

5.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.



4.1.3 EUT RF Exposure Evaluation

1) exposure conditions for standalone operations

Antenna Gain: 12.5dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 17.78 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 172 cm (mW/cm ²)	Limit (mW/cm ²)	Result
Lowest	879	44	25118.86	1.2015	2.93	PASS

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 172 cm (mW/cm ²)	Limit (mW/cm ²)	Result
Middle	2532	44	25118.86	1.2015	5.0	PASS

Note: Refer to **Tune Up Procedure document** for EUT Max Conducted Peak Output Power value. The distancer (4th column) calculated from the Fries transmission formula is far greater than 172 cm separation requirement.

2) exposure conditions for simultaneous transmission operations

Simultaneous transmission MPE test is not required, because the Max. sum of the MPE ratios for 800MHz and 2.4GHz is $0.41+0.24=0.65 < 1$

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